



TITLE:

On the Solvation of Dispersed Systems. (I) : Plastic Deformation and Slip Bands

AUTHOR(S):

Goto, Rempei; Hirai, Nishio

CITATION:

Goto, Rempei ...[et al]. On the Solvation of Dispersed Systems. (I) : Plastic Deformation and Slip Bands. 京都大学化学研究所報告 1950, 20: 48-48

ISSUE DATE:

1950-03-20

URL:

<http://hdl.handle.net/2433/74063>

RIGHT:

ϵ' of the system rises with increasing temperature and the more water content, the higher ϵ' at a given temperature. In case of less water content ϵ'' rises with the increasing temperature, but with higher water content ϵ'' has a maximum at a given temperature, but decreases at higher temperature. This loss perhaps is due to rotation of dipoles of water molecules in starch. We can evaluate the relaxation time, by means of representing the values of ϵ' and ϵ'' for each system as a circular arc locus. (K. S. Cole and R. H. Cole: J. Chem. Phys. **9**, 341 (1941)). The values of τ for samples with water content more than 10% were found to be of the order of 10^{-9} seconds at room temperature, and τ_0 for "α" modification seems somewhat larger than that for "β" one for the same water content. Also from the circular arc loci, it may be inferred that the distribution of relaxation time is fairly broad.

From the above considerations, it appears that molecules of water loosely bound with starch in the systems in which the dispersion of the dielectric constant occurs at the present frequency in the neighbourhood of room temperature.

10. On the Solvation of Dispersed Systems. (I)

Plastic Deformation and Slip Bands.

Rempei Goto and Nishio Hirai.

When the block of Bentonite clay kneaded with water which is thixotropic, is pressed with two parallel planes, there appear distinct slip-bands on the surface of the clay and the lines of band are inclined at 45° in the direction of the force given. If Bentonite has been heated above 800°C beforehand, it becomes hydrophobic and shows remarkable dilatancy. Then, the slip bands do not appear and lines of crevice are observed to incline at 60° in the direction of the force. Under heat treatment at 550°C . There appears no slip band nor line of crevice and becomes as plastic as usual clay. Thus, in accordance with the degree of dehydration by heat treatment, thixotropic (hydrophilic) Bentonite becomes plastic and hydrophobic. Dehydrating with alcohol or NaCl, Bentonite clay kneaded with water becomes very plastic.

All the lyophobic dispersion systems which are composed of fine powders and liquid (for instance; S, CaCO_3 and starch with H_2O ; Bentonite with benzene or oil) shows dilatancy and lines of crevice are inclined at 60° to the force.

It is considered that gellation, thixotropy, plasticity, dilatancy, slip band and lines of crevice all correspond to the degree of affinity between dispersion phase and their medium.